

## Psychiatric Comorbidity in the Subtypes of ADHD in Children and Adolescents with ADHD According to DSM-IV

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### ABSTRACT

**Introduction:** The prevalence rate of psychiatric comorbidity in children and adolescents with Attention Deficit Hyperactivity Disorder (ADHD) was 60-80%. The objective of this study was to examine comorbid disorders associated with ADHD and the subtypes of ADHD in children and adolescents with the diagnosis of ADHD.

**Method:** The study included 326 children and adolescents aged between 8-15 years who were diagnosed with ADHD for the first time as a result of an interview by psychiatry, in a child adolescent psychiatry clinic in İzmir. Sociodemographic form, Turgay DSM-IV Disruptive Behavior Disorders Rating Scale and Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children Present and Lifetime version were used to assess psychiatric comorbidity.

**Results:** The comorbidities accompanied ADHD were disruptive behavior disorder (28.8%), depressive disorder (13.2%), obsessive-compulsive disorder (9.5%) and anxiety disorder (6.1%). When the subtypes of ADHD were assessed according to psychiatric comorbidity, oppositional defiant disorder and conduct disorder were frequently seen with ADHD combined type, whereas anxiety disorder was more frequent with ADHD inattentive type.

**Discussion:** Comorbidity in ADHD Combined type increases the severity of disease, delays treatment response and exacerbates prognosis. Therefore, it is very important to determine which psychiatric diagnosis accompany with ADHD.

**Keywords:** ADHD, psychiatric comorbidity, subtypes of ADHD

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### INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder, characterized by developmentally inappropriate low attention span, inattentiveness, hyperactivity and impulsivity, that directly affects the individual's activities related to society, school and career (1). The prevalence of ADHD in school-age children, from epidemiological studies regarding ADHD, is estimated to be between 3-7% (2). When examining clinical and epidemiological samples on the basis of sex, ADHD is known to be more common in males. In clinical samples, the male/female ratio is 9/1, whereas in epidemiological samples it's 3/1 (3). ADHD consists of 3 subtypes, the primarily inattentive ADHD subtype, the primarily hyperactivity ADHD subtype, and the combined ADHD subtype (4). For the last fifteen years, there have been differing perspectives on the classification of ADHD subtypes. Even though certain researchers (5,6) have included recommendations in their research for a more accurate classification of ADHD subtypes in the DSM-IV, there hasn't been any revisions regarding the aforementioned subtypes in DSM-V. Studies examining the prevalence of ADHD subtypes have found that the primarily inattentive ADHD subtype is the most common subtype. A

recent study which was conducted in Turkey with 1000 participants, has found that 39.9% of the participants were diagnosed with the primarily inattentive ADHD subtype, 3% of the participants were diagnosed with the primarily hyperactivity ADHD subtype, and 57.1% of the participants were diagnosed with the combined subtype (7). In another study, the prevalence of combined ADHD subtype was found to be 52.3%, primarily inattentive ADHD subtype was found to be 44.4%, and the primarily hyperactive ADHD subtype was found to be 3.3% (8). Prediagnosis of ADHD keep in mind in all cases who admitted to the psychiatry clinic because it is one of the most prevalent childhood disorder. Additionally, even though hyperactivity symptoms can decrease as the individual ages, the inattentiveness can persist which should be taken in to account before taking action (9). This situation shows that patients with ADHD-C or ADHD-HI are likely to convert to the ADHD-I with age. If not treated from an early age, problems stemming from ADHD can persist in up to 60-80% capacity in adolescence, up to 40-60% capacity in adulthood (10). In every age group, 60-80% of the time, there is at least one additional comorbid disorder accompanying ADHD (4, 11). In epidemiological

and clinical studies, rates of accompanying comorbidity were as follows: behavioral disorders 30-50%, mood disorders 15-75%, anxiety disorders 25%. Additionally, a significant portion (24.7%) of participants with ADHD had at least two comorbid disorders (12). In a study conducted in Denmark by Jensen and Steinhausen in 2014, commonly referred as the most comprehensive study in this matter (N:14825), found that 52% of children between the ages 4-17 had at least one comorbid disorder, and the most common comorbid disorder was found to be behavioral disorder (16.5%) (13). Additional studies have shown that the amount of comorbid diagnoses increased as age decreased. Conversely, studies have shown that as age increased, comorbid diagnoses decreased (14,15). When examined on the basis of sex, comorbid disorders such as oppositional defiant disorder, behavioral disorder and substance use disorder were more common in males, whereas anxiety, depression and eating disorders were more common in females (4). When examined on the basis of subtypes, oppositional defiant disorder was more common in the combined ADHD subtype than in the primarily inattentive ADHD subtype (16, 17). It can be inferred from literature that comorbid disorders accompanying ADHD, increase the severity of the disorder and negatively impact prognosis. Consequently, knowledge of the comorbid symptoms accompanying ADHD will probably be the most important factor that determines the prognosis and reaction to treatment (4, 7). Children and adolescents with ADHD are known to have at least one comorbid disorder such as behavioral disorder, anxiety disorder, depression, obsessive compulsive disorder, substance abuse disorders, which is of particular concern. This illustrates how ADHD can form the basis of many other disorders and why it should be treated. For this reason, ADHD, which causes various medical, academic, and social problems, should be better known, additionally, accurately diagnosing and treating the comorbidities accompanying ADHD is crucial. ADHD comorbidities are known to increase the severity of the disorder, and therefore, understanding the comorbidities accompanying ADHD will probably be the most important factor in assessing both prognosis and response to treatment. Additionally, we speculate that the comorbidities accompanying ADHD subtypes, referred to in DSM-V as appearance, will differ from subtype to subtype, which might effect prognosis. In other words, the assessment of appearances accompanying ADHD is of vital importance for determining prognosis. This study intends to find psychiatric comorbidities accompanying ADHD in terms of ADHD subtypes in children and adolescents.

## METHODS

### Sample

Participants were from Izmir, and they had sought clinical help, for the first time, in a child and adolescent psychiatry clinic between the months of June and October, 2018. Upon conducting clinical sessions in accordance with the Schedule for Affective Disorders and Schizophrenia for School Age Children – Present and Lifelong type, which is based on diagnostic criteria from DSM-IV, 326 participants between the ages of 8-15, who were diagnosed with ADHD, were included in the sample. Sampling of the study was done via purposive sampling. Age and diagnostic criteria were taken into consideration during participant inclusion. Participants with ADHD, who were volunteers, were chosen by a psychologist at random. The sample consists of 85 females and 241 males. The average age of the sample was 11. Upon being diagnosed with ADHD, participants were divided into groups based on ADHD subtypes via assessment through the Destructive Behavioral Disorders Screening and Assessment Scale based on DSM-IV. According to DSM-IV, there are three subtypes of ADHD, the primarily hyperactive ADHD subtype, the primarily inattentive ADHD subtype, and the combined ADHD subtype. Participants who had at least 6 out of the 9 diagnostic criteria for primarily hyperactive ADHD subtype, were assigned to the primarily hyperactive ADHD subtype

group. Participants who had at least 6 out of the 9 diagnostic criteria for primarily inattentive ADHD subtype, were assigned to the primarily inattentive ADHD subtype group. Participants who had at least 6 out of the 9 diagnostic criteria, in both the primarily inattentive ADHD subtype, and the diagnostic criteria for the primarily hyperactive ADHD subtype, were assigned to the combine ADHD subtype group.

### Materials

**Sociodemographic Information Form:** Questions regarding, age, sex, level of education, and their current year in education were included in the sociodemographic form. In order to assess the socioeconomic status of participants, questions regarding the income, and the occupation of their parents were included. The form was developed by one a researcher in the study.

### The Schedule for Affective Disorders and Schizophrenia for School Age Children – Present and Lifelong Type:

The Schedule for Affective Disorders and Schizophrenia for School Age Children – Present and Lifelong type, is a session form, developed by Kaufman and colleagues. (1997), that is used to gauge the current and past psychopathological condition of children and adolescents, based on diagnostic criteria from DSM-III-R, and DSM-IV. The Turkish adaptation of The Schedule for Affective Disorders and Schizophrenia for School Age Children – Present and Lifelong type, was done by Gökler and colleagues. (2004) (19).

### The Destructive Behavioral Disorders Screening and Assessment Scale Based on DSM-IV:

The scale, which was developed in accordance to DSM-IV, contains nine items for assessing inattention, six items for assessing hyperactivity, three items for assessing impulsivity, eight items for assessing oppositional defiant disorder, and fifteen items for behavioral disorders. The form was filled in by the parents of participants who were diagnosed with ADHD. Every item contains the following responses, 0=None, 1=Somewhat, 2=High, 3=Very high. The reliability and validity study of the scale was conducted by Ercan and colleagues. (2001) (20).

### Procedure

Upon conducting clinical sessions in accordance with the Schedule for Affective Disorders and Schizophrenia for School Age Children – Present and Lifelong type, which is based on diagnostic criteria from DSM-IV, 350 participants between the ages of 8-15, who were diagnosed with ADHD, were chosen for the sample at random by a psychologist. Twenty-four children, who refused to be included in the study, and were deemed ineligible for the study, were excluded from the sample. After being given basic information regarding, children and adolescents gave verbal consent. Written and verbal informed consent were obtained from the parents. Participants then filled out the Sociodemographic Information Form, and the Destructive Behavioral Disorders Screening and Assessment Scale. Permission for conducting the study was given by the Hasan Kalyoncu University Social Sciences Institutional Review Board. Inclusion criteria for volunteers consisted of, being between the ages of 8-15, having consent from both the child and their parents, and being diagnosed with ADHD for the first time, in line with DSM-IV-TR criteria, upon a session conducted in accordance with the Schedule for Affective Disorders and Schizophrenia for School Age Children – Present and Lifelong type. Exclusion criteria for volunteers consisted of, having a psychiatric disorder based on organic factors, having severe mental retardation or a similar complication to the extent where it obstructs psychological sessions, having been previously diagnosed with ADHD from a different clinic, receiving psychiatric treatment for a period of time from a mental health professional, being younger than 8 years or being older than 16 years of age.

### Data Analysis and Interpretation

SPSS 15 program was used. Distribution of data, and normality tests

was conducted to assess whether or not the distribution was similar to normal distribution. Categorical variables were summarized by “n and %”, whereas continuous variables were summarized by their means and standard deviation. Chi Square, and One-Way ANOVA were conducted while comparing categorical variables between groups.  $P < .05$  was deemed significant.

## RESULTS

### Distribution of Sociodemographic Variables

There were 85 females (26.1%), and 241 males (73.9%) in the study. A total number of 326 children and adolescents were in the study. The average age of the group was found to be  $11.2 \pm 2.42$ . No meaningful relationship was found between the mean age of females, and mean age of males ( $p < .05$ ). Out of all the participants, 56.4% ( $n=184$ ) were in the age group of 8-11, whereas 43.6% ( $n=142$ ) were in the age group of 12-15. In terms of socioeconomic status of participants' families, 14.4% ( $n=47$ ) were in the low-income group, 46.3% ( $n=151$ ) were in the middle-income group, and 39.3% ( $n=128$ ) were in the high-income group. In terms of educational background of mothers, 5.9% ( $n=19$ ) were elementary-school graduates, 14.1% ( $n=46$ ) were middle-school graduates, 31.3% ( $n=102$ ) were high-school graduates, 41.1% ( $n=134$ ) had an undergraduate degree, and 7.7% ( $n=25$ ) had a postgraduate degree. In terms of educational background of fathers, 3.3% ( $n=11$ ) were elementary-school graduates, 12.6% ( $n=41$ ) were middle-school graduates, 31.6% ( $n=102$ ) were high-school graduates, 37.7% ( $n=123$ ) had an undergraduate degree, and 15% ( $n=49$ ) had a postgraduate degree.

### Distribution in Terms of ADHD Subtype in Participants Diagnosed with ADHD

In terms of their ADHD subtype diagnosis, 45.4% ( $n=148$ ) of participants were diagnosed with primarily inattentive ADHD subtype, 2.1% ( $n=7$ ) of participants were diagnosed with primarily hyperactive ADHD subtype, and 52.5% ( $n=171$ ) of participants were diagnosed with combined ADHD subtype. Upon comparing the age group of participants with the ADHD subtype diagnosis of participants, a statistically meaningful difference between the 8-11 age group and the 12-15 age group was found. ( $\chi^2=9.38$ ,  $p < 0.05$ )

The combined ADHD subtype was more common in children in the 8-11 age group, whereas the primarily inattentive ADHD subtype was more common in adolescents in the 12-15 age group. Distribution of ADHD subtype diagnosis in terms of age is provided in Table 1.

When compared in terms of sex, a significant difference between males and females was found regarding ADHD subtype diagnosis ( $\chi^2=7.22$ ,  $p < 0.05$ ). The combined ADHD subtype was more frequently seen in males, whereas the primarily inattentive ADHD subtype was more frequent in females. Distribution of ADHD subtype diagnosis in terms of sex is shown in Table 2.

**Table 1.** Distribution of ADHD subtypes in terms of age group

ADHD Subtype	8-11 age group	12-15 age group	P
	n-%	n-%	
Combined ADHD subtype	109-59.2	62-43.7	
Primarily inattentive ADHD subtype	70-38	78-54.9	0.009*
Primarily hyperactive ADHD subtype	5-2.7	2-1.4	

ADHD: Attention Deficit Hyperactivity Disorder; ADHD-I: Attention Deficit Hyperactivity Disorder Inattentive Type; ADHD-H: Attention Deficit Hyperactivity Disorder Hyperactive Type, \* $p < 0.05$ .

**Table 2.** Distribution of ADHD subtypes in terms of gender group

ADHD subtype	Female	Male	P
	n-%	n-%	
Combined ADHD subtype	109-59.2	62-43.7	
Primarily inattentive ADHD subtype	70-38	78-54.9	.009
Primarily hyperactive ADHD subtype	5-2.7	2-1.4	

ADHD: Attention Deficit Hyperactivity Disorder; ADHD-I: Attention Deficit Hyperactivity Disorder Inattentive Type; ADHD-H: Attention Deficit Hyperactivity Disorder Hyperactive Type, \* $p < 0.05$ .

### Psychiatric Comorbidity in Participants Diagnosed with ADHD

Out of the 326 participants diagnosed with ADHD, 49.7% ( $n=162$ ) were diagnosed only with ADHD, whereas 50.3% ( $n=164$ ) had at least one comorbid disorder with ADHD.

When examined in more detail, 126 participants (38.7%) had one comorbid psychiatric disorder, 29 participants (8.9%) had 2 comorbid psychiatric disorders, 9 participants (2.8%) had 3 or more comorbid disorders.

Distribution of comorbid disorders in participants diagnosed with ADHD is shown in Table 3. When compared in terms of sex, 55.3% ( $n=47$ ) of female participants with ADHD had at least one comorbid disorder, whereas 48.5% ( $n=117$ ) of male participants with ADHD had at least one comorbid disorder. There was no significant difference between males and females ( $p > .05$ ).

When examined in terms of sex, the most common comorbid psychiatric disorder in participants with ADHD was disruptive behavior disorders. Out of all participants, 28.6% ( $n=93$ ) had been diagnosed with disruptive behavior disorders, and the most common disruptive behavior disorder was found to be oppositional defiant disorder. Oppositional defiant disorder was more common in males ( $\chi^2=3.69$ ,  $p < .05$ ). The second most common comorbid disorder were mood disorders. Major depression, which is a mood disorder, was more frequent in female participants as a comorbid disorder, and significant difference between males and females was found ( $\chi^2=6.40$ ,  $p < .05$ ). The third most common comorbid disorder was found to be obsessive compulsive disorder. ( $p > .05$ ). The fourth most

**Table 3.** Psychiatric comorbidities according to ADHD subtypes

Comorbidities	Participants (n)	%
ADHD without comorbidity	162	49.7
ODD	83	25.7
Behavior disorder	10	3.1
Major depression	43	13.2
OCD	31	9.5
Anxiety disorder	20	6.1
Asperger syndrome	11	3.4
Tourette syndrome	6	1.8
Trichotillomania	4	1.2
Bipolar disorder	2	0.6
Selective mutism	2	0.6
Enuresis and encopresis	2	0.6

ADHD: Attention Deficit Hyperactivity Disorder; ADHD-I: Attention Deficit Hyperactivity Disorder Inattentive Type; ADHD-H: Attention Deficit Hyperactivity Disorder Hyperactive Type, \* $p < 0.05$ ; ODD: Oppositional Defiant Disorder; OCD: Obsessive Compulsive Disorder

**Table 4.** Psychiatric comorbidities with ADHD children according to gender

Comorbidities	Male		Female		p
	N	%	N	%	
ODD	15	17.6	68	28.6	.035*
Behavior disorder	1	1.2	9	3.7	.21
Major depression	18	21.2	25	10.4	.01*
OCD	8	9.4	23	9.5	.58
Anxiety disorder	12	14.1	8	3.3	.001*
Asperger syndrome	3	3.5	8	3.3	.58
Tourette syndrome	1	1.2	5	2.1	.50
Trichotillomania	-	-	4	1.7	.29
Bipolar disorder	2	2.4	-	-	.06
Selective mutism	-	-	2	0.8	.54
Enuresis and encopresis	-	-	2	0.8	.54

ADHD: Attention Deficit Hyperactivity Disorder; ADHD-I: Attention Deficit Hyperactivity Disorder Inattentive Type; ADHD-H: Attention Deficit Hyperactivity Disorder Hyperactive Type. \* $p < .05$ ; ODD: Oppositional Defiant Disorder; OCD: Obsessive Compulsive Disorder

common comorbid disorder was anxiety disorder. Anxiety disorder was more frequently observed in females ( $\chi^2 = 12.7$ ,  $p < .05$ ). No significant difference between males and females was found in other comorbid disorders accompanying ADHD, such as selective mutism, ODD, OCD, bipolar disorder, Trichotillomania, Asperger syndrome, Tourette syndrome, enuresis and encopresis ( $p > .05$ ). Distribution of comorbid disorders in participants diagnosed with ADHD, based on sex, is provided in Table 4.

In order to deduce whether age had an effect on comorbid disorders accompanying ADHD, the distribution of comorbid disorders in participants based on age groups was examined. In the 8-11 age group, 65.3% ( $n=120$ ) of participants had at least one comorbid disorder alongside ADHD, whereas in the 12-15 age group, 70.3% ( $n=101$ ) of participants had at least one comorbid disorder alongside ADHD. Distribution of comorbid disorders based on age group is provided in Table 5.

Major depression as a comorbid disorder was more common in adolescents in the 12-15 age group, and the difference was significant ( $p = .05$ ).

**Table 5.** Psychiatric comorbidities with ADHD children according to age group

	8-11 years old (children)		12-15 years old (adolescent)		p
	N	%	N	%	
ODD	51	27.7	32	22.5	.17
Behavior disorder	6	3.3	4	2.8	.54
Major depression	19	10.3	24	16.9	.05
OCD	15	8.2	16	11.3	.22
Anxiety disorder	6	3.3	14	9.9	.013*
Asperger syndrome	11	6	7	4.1	.002*
Tourette syndrome	4	2.2	2	1.4	.47
Trichotillomania	3	1.6	1	0.7	.41
Bipolar disorder	1	0.5	1	0.7	.68
Selective mutism	2	1.1	-	-	.31
Enuresis and encopresis	2	1.1	-	-	.31

ADHD: Attention Deficit Hyperactivity Disorder; ADHD-I: Attention Deficit Hyperactivity Disorder Inattentive Type; ADHD-H: Attention Deficit Hyperactivity Disorder Hyperactive Type. \* $p < .05$ ; ODD: Oppositional Defiant Disorder; OCD: Obsessive Compulsive Disorder

Anxiety disorder as a comorbid disorder was more frequent in adolescents in the 12-15 age group, and significant difference was found between the age groups ( $\chi^2 = 6.05$ ,  $p < .05$ ).

Asperger syndrome was observed in 6% ( $n=11$ ) of child participants in the 8-11 age group, and significant difference was found between the age groups ( $\chi^2 = 8.78$ ,  $p < .05$ ).

No significant difference was found in other comorbid disorders accompanying ADHD in children and adolescents, including ODD, OCD, Tourette syndrome, Trichotillomania, bipolar disorder, behavioral disorder, and selective mutism ( $p > .05$ ).

### Psychiatric Comorbidities Accompanying ADHD in Terms of ADHD Subtype

Distribution of ADHD comorbidities based on ADHD subtype is provided in Table 6. When examined in terms of disruptive behavior disorders, 42.9% ( $n=3$ ) of participants who were diagnosed with primarily hyperactive ADHD subtype, and 42.7% ( $n=73$ ) of participants who were diagnosed with ADHD combined subtype had been diagnosed with oppositional defiant disorder, and significant difference was found between the

**Table 6.** Psychiatric comorbidities according to ADHD subtypes

	ADHD-Primarily Inattentive		ADHD-Primarily Hyperactive		ADHD-Combined ADHD		P	F
	n	%	N	%	n	%		
ODD	7	4.7	3	42.9	73	42.7	.000*	37.46
Behavior disorder	-	-	1	14.3	9	5.3	.005*	5.33
Major depression	19	12.8	1	14.3	23	13.5	.098	.017
OCD	11	7.4	2	28.6	18	10.5	.143	1.95
Anxiety disorder	15	10.1	-	-	5	2.9	.02*	5.33
Asperger syndrome	4	2.7	-	-	7	4.1	.70	.35
Tourette syndrome	1	0.7	-	-	5	2.9	.31	1.175
Trichotillomania	3	2	-	-	1	0.6	.48	.72
Bipolar disorder	2	1.4	-	-	-	-	1.208	.30
Selective mutism	2	1.4	-	-	-	-	1.208	.30
Enuresis and encopresis	-	-	-	-	2	1.2	.404	.909

ADHD: Attention Deficit Hyperactivity Disorder; ADHD-I: Attention Deficit Hyperactivity Disorder Inattentive Type; ADHD-H: Attention Deficit Hyperactivity Disorder Hyperactive Type. \* $p < .05$ ; ODD: Oppositional Defiant Disorder; OCD: Obsessive Compulsive Disorder

ADHD subtypes ( $F=37,46$ ,  $p=.000$ ). Participants who were diagnosed with combined ADHD subtype were more frequently diagnosed with ODD when compared to other subtypes. When examined in terms of behavioral disorders between ADHD subtypes, significant difference was found ( $F=5,33$ ,  $p=.005$ ), and behavioral disorders were most frequent in participants who were diagnosed with combined ADHD subtype. When examined in terms of anxiety disorders, significant difference was found between ADHD subtypes and prevalence of anxiety disorder ( $F=5,33$ ,  $p=.02$ ). Anxiety disorder comorbidity was more frequent in participants who were diagnosed with primarily inattentive ADHD subtype. No significant difference was found between ADHD subtypes, and other psychiatric comorbidities such as major depression disorder, OCD, Asperger syndrome, bipolar disorder, selective mutism, Tourette syndrome, enuresis and encopresis ( $p>.05$ ).

## DISCUSSION

It's known that in every age group, there is 60% to 80% prevalence of at least one comorbid psychiatric disorder (4). If left untreated, ADHD is known to cause medical, academic, and social problems, thus it's crucial to carefully diagnose and treat ADHD comorbidities accompanying ADHD subtypes. Specifically, comorbid psychiatric disorders are more frequently seen in combined ADHD subtype, which can delay treatment response, worsen the severity of the condition, and worsen the prognosis. Thereby diagnosing ADHD comorbidities is vital.

Consequently, we determined psychiatric comorbidities in terms of ADHD subtype in participants diagnosed with ADHD, and we examined the relationship between psychiatric comorbidities, and ADHD subtypes, sex, and age. In terms of sex, participants who were diagnosed with ADHD were predominantly male, as was seen in many other studies (7, 21, 22).

When examining ADHD subtypes in our study, combined ADHD subtype (45.4%) was the most common subtype (8, 23, 24). In terms of sex, combined ADHD subtype was the most common in males, whereas the primarily inattentive ADHD subtype was most common in females (7, 25). In terms of age group, combined ADHD subtype was most common in the 8-11 age group, whereas the primarily inattentive ADHD subtype was most common in 12-15 age group (8, 25). Out of the 326 participants diagnosed with ADHD in our study, 50.3% ( $n=164$ ) had at least one psychiatric comorbidity. In a study conducted in our country, which included 242 females, and 758 males, a total of a 1000 between the ages of 6-18, 56.3% had at least one psychiatric comorbidity (7). In a recent study similar to ours, 40.7% of participants with ADHD were found to have at least one psychiatric comorbidity (26). Barkley and colleagues. (2006) found that, 44% of children and adolescents diagnosed with ADHD had at least one psychiatric comorbid disorder, whereas 43% had at least two or more psychiatric comorbid disorders (27). In children and adolescents diagnosed with ADHD, the most common comorbid disorder is oppositional defiant disorder. Our findings in this study, in addition to other studies done in the field, also found that ODD was the most common comorbid psychiatric disorder (23, 28, 29). Similarly, Zorlu and colleagues. (2015), a study in our country, found that 22.6% of comorbid disorders in participants with ADHD was ODD. When examined in terms of sex, the results from our study is in line with the current literature, where comorbid ODD was more common in males than females, and the difference was found to be statistically significant (11, 31). When examined in terms of age groups, both ODD and behavioral disorder comorbidity was found to be more common in children (7, 32). Our study had a result similar to other studies comparing ADHD subtypes, where ODD and behavioral disorder was more common in combined ADHD subtype (8, 21). We found that the second most common comorbidity accompanying ADHD was major depression disorder, with 13.2% observance rate. Other

studies conducted in the field found that, anxiety disorders, ADHD, and disruptive behavior disorders were frequently observed in comorbidity with substance addiction (2, 4). When examining our findings alongside other studies in terms of sex, major depression was more common in females (21.2%) than males (10.4%) (25). When examining our findings alongside other studies in terms of age, major depression was more frequent in adolescents than in children (25, 33, 34). In a longitudinal study conducted with 1420 children and adolescents, academic problems caused by untreated ADHD can increase risk of major depression. Which means that incompetency, negative environmental factors, rejections, and constant negative responses caused by untreated ADHD beginning from childhood might be making individuals more susceptible to depression (4).

When examined in terms of ADHD subtype, our findings were in line with the current literature, where no statistically significant difference was found between ADHD subtypes (24, 35). The third most common comorbid psychiatric disorder seen alongside ADHD in our study was obsessive compulsive disorder, and was seen in 9.5% of participants. In other studies, the rate of OCD was found to be 13.6% (36). While certain studies found no statistically significant difference in terms of sex (7, 37), some studies have found that OCD was more common in males than in females (31, 38). In our sample, and the general population, males are more likely to be diagnosed with ADHD which might explain the lack of differences between males and females in OCD. Even though no statistically significant difference was found in age groups, when examined, OCD was more frequent in adolescents, which may be caused by ADHD symptoms appearing in an earlier age in childhood, whereas OCD symptoms often appear in early adolescence and young adulthood (39). When compared in terms of ADHD subtype, no statistically significant difference was found, and even though there were finding from other studies that were both similar (37) and contrasting (7) from our study, more research needs to be done examining OCD comorbidity and ADHD. Anxiety disorder (6.1%) was the fourth most common comorbid psychiatric disorder in our study. Similar to our findings, a study conducted in our country found the rate of comorbid anxiety disorder to be 6% (37). The high rate of prevalence of comorbid anxiety disorder (30-35%) in other studies might stem from organizing anxiety disorders under a single category and thereby obtaining a total rate of anxiety disorders rather than individually assessing each disorder (23, 40). Regardless, the statistically significant high rate of prevalence of comorbid anxiety disorders accompanying ADHD, might be caused by the problems children and adolescents have due to ADHD, which might increase the rate of anxiety disorder comorbidity. In line with the current literature, our findings revealed that, when examined in terms of sex, comorbid anxiety disorder is more frequently observed in females than males (41, 42). When examined in terms of age group, comorbid anxiety disorder is more frequently observed in adolescents than in children (32, 43, 44). When examined in terms of ADHD subtype, anxiety disorder comorbidity is more frequently observed in primarily inattentive ADHD subtype (10.1%) (7, 37). Additionally, some studies have found that frequency of comorbid anxiety disorder accompanying ADHD is similar between combined ADHD subtype and primarily inattentive ADHD subtype (24, 35). Our findings, similar to other studies, revealed that Asperger syndrome comorbidity accompanying ADHD was observed at a rate of 3.4%, and no statistically significant difference between males and females was found. Since Asperger syndrome is more commonly diagnosed during childhood, the frequency of Asperger syndrome was higher in children. Even though our study found no significant difference between ADHD subtypes and Asperger syndrome comorbidity, the current literature suggests that Asperger syndrome comorbidity is seen more frequently in combined ADHD subtype (45). Even though we observed Tourette syndrome comorbidity accompanying ADHD at a rate of 1.8%, observance of Tourette syndrome comorbidity in ADHD can

change at a rate between 8-80% (46). Similar to other studies, we found no meaningful difference between frequency of Tourette syndrome accompanying ADHD, and age, sex, or ADHD subtype (7, 47). Our study found the rate of trichotillomania comorbidity accompanying ADHD to be 1.2% in our sample. Similar to other studies, our study found no statistically significant difference between Trichotillomania comorbidity accompanying ADHD, and age, sex, or ADHD subtype (7).

The rate of frequency of comorbid bipolar disorder accompanying ADHD was found to be 0.6%, and was seen in two female participants. The rate of selective mutism comorbidity accompanying ADHD was 0.6%, and in line with the current literature, no statistically significant difference between age, sex, or ADHD subtype was found (7). The rate of enuresis and encopresis comorbidity accompanying ADHD was found to be 0.6%. Consequently, ADHD is a crucial psychiatric disorder that can lead to many psychiatric, academic, and social problem. The treatment and diagnosis of ADHD is vital, and if left untreated, the severity of the disorder alongside the rate of comorbid disorders will increase. Consequently, the diagnosis of ADHD, and the comorbid disorders accompanying ADHD subtypes, will greatly affect prognosis. When looking at ADHD subtypes, comorbid disorders can change by ADHD subtype, hence our understanding of ADHD subtypes can greatly affect the treatment response, in addition to being a valuable tool for assessing the severity of ADHD. In line with the current literature, the combined ADHD subtype was found to have a meaningful relationship with OCD and behavior disorder, whereas the primarily inattentive ADHD subtype was found to have a meaningful relationship with anxiety disorder. Our study suggests that, taking the findings of our study, which are in line with the current literature, into consideration can positively affect prognosis. Before examining the data gathered, it should be noted that our study was clinically based. It was thought that the presence of psychiatric comorbidities may have facilitated the admission to the clinic by negatively affecting the functionality. Moreover, most of the participants in our study who sought clinical help were from middle to high socioeconomic class, it might have artificially affected the frequency of certain psychiatric comorbid disorders. Since more comorbid disorders can be observed in combined ADHD subtype, additional community-based studies are required.

**Ethics Committee Approval:** Approval was obtained from Hasan Kalyoncu University Social Sciences Institute Ethics Committee in order to conduct the research.

**Informed Consent:** After giving information about the study, verbal consent was obtained from children and adolescents, and verbal and written consent was obtained from parents, and the Sociodemographic Data Form and Screening and Evaluation Scale of Disruptive Behavior Disorders were applied in all interviews.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - ESE, Mİ; Design - Mİ; Supervision - MHT; Resource - ESE; Materials - ESE; Data Collection and/ or Processing - SBİİ, Mİ; Analysis and/or Interpretation - Mİ, SBİİ; Literature Search - ÜAA; Writing - Mİ, SBİİ; Critical Reviews - KÖ.

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